

## Hand Tools

- Greatest hazards posed by hand tools result from misuse and improper maintenance, for example:
  - Using a screwdriver as a chisel may cause the tip to break and fly
  - If a wooden handle on a tool such as a hammer or an axe is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker
  - A wrench must not be used if its jaws are sprung, because it might slip
  - Impact tools such as chisels, wedges, or drift pins are unsafe if they have mushroomed heads which might shatter on impact, sending sharp fragments flying
- Employer is responsible for the safe condition of tools and equipment used by employees
- Saw blades, knives, or other tools should be directed away from aisle areas and other employees working in close proximity
- Knives and scissors must be sharp (dull tools can be more hazardous than sharp ones)
- Keep floors as clean and dry as possible to prevent accidental slips with or around dangerous hand tools
- Use spark-resistant tools made from brass, plastic, aluminum, or wood around flammable substances

## Power Tool Precautions

- Never carry a tool by the cord or hose or yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.
- All observers should be kept at a safe distance away from the work area.
- Secure work with clamps or a vise, freeing both hands to operate the tool.
- Avoid accidental starting. Do not hold a finger on the switch button while carrying a plugged-in tool.
- Tools should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories.
- Be sure to keep good footing and maintain good balance.
- The proper apparel should be worn. Loose clothing, ties, or jewelry can become caught in moving parts.
- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use."

## This image shows a full page of blank handwriting practice paper. It features multiple sets of horizontal lines designed to guide letter formation. Each set consists of a solid top blue line, a dashed middle blue line, and a solid bottom blue line. These lines are repeated down the entire page to provide a consistent framework for practicing letter height and placement. The paper is otherwise completely blank, with no text or markings other than the ruling lines.

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- This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins or other markings visible.

- The following hand-held powered tools must be equipped with a momentary contact "on-off" control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than 2 inches in diameter, disc and belt sanders, reciprocating saws, saber saws, and other similar tools.
- These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
- The following hand-held powered tools may be equipped with only a positive "on-off" control switch: platen sanders, disc sanders with discs 2 inches or less in diameter; grinders with wheels 2 inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks 1/4-inch wide or less.
- Other hand-held powered tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released.

## Electric Tools

- Among the chief hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure.
- Under certain conditions, even a small amount of current can result in fibrillation of the heart and eventual death.
- A shock also can cause the user to fall off a ladder or other elevated work surface.
- To protect the user from shock, tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer.
- Three-wire cords contain two current-carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool's metal housing. The other end is grounded through a prong on the plug. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong should *never* be removed from the plug.
- Double insulation is more convenient. The user and the tools are protected in two ways: by normal insulation on the wires inside, and by a housing that cannot conduct electricity to the operator in the event of a malfunction.

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## Electric Tools (cont'd)

These general practices should be followed when using electric tools:

- Electric tools should be operated within their design limitations.
- Gloves and safety footwear are recommended during use of electric tools.
- When not in use, tools should be stored in a dry place.
- Electric tools should not be used in damp or wet locations.
- Work areas should be well lighted.

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## Powered Abrasive Wheel Tools

- Before an abrasive wheel is mounted, it should be inspected closely and "ring-tested" as follows:
  - Tap gently with a light non-metallic instrument
    - If wheel sounds cracked or dead, it could fly apart in operation and so must not be used
    - An undamaged wheel will give a clear metallic tone or "ring."
- Follow the manufacturer's recommendations when mounting the abrasive wheel.
- Never stand directly in front of the wheel as it accelerates to full operating speed due to the possibility of a wheel disintegrating (exploding) during start-up.
- Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.
- In addition, when using a powered grinder:
  - Always use eye protection.
  - Turn off the power when not in use.
  - Never clamp a hand-held grinder in a vise.

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## Pneumatic Tools

- Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.
- Primary danger encountered in the use of pneumatic tools is the possibility of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.
- Eye protection is required and face protection is recommended for employees working with pneumatic tools.
- Working with noisy tools such as jackhammers requires proper, effective use of hearing protection.
- When using pneumatic tools, employees must check to see that they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.
- A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.
- Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills.
- Compressed air guns should never be pointed toward anyone. Users should never "dead-end" it against themselves or anyone else.

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## Powder-Actuated Tools

- Powder-actuated tools operate like a loaded gun and must be treated with the same respect and precautions. In fact, they are so dangerous that they must be operated only by specially trained employees.
- Safety precautions to remember include the following:
  - Do not use in an explosive or flammable atmosphere.
  - Before using the tool, inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.
  - The tool should never be pointed at anybody.
  - The tool should not be loaded unless it is to be used immediately. A loaded tool should not be left unattended, especially where it would be available to unauthorized persons.
  - Hands should be kept clear of the barrel end. To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool.

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## Powder-Actuated Tools (cont'd)

- If a powder-actuated tool misfires, wait at least 30 seconds, then try firing it again. If it still will not fire, wait another 30 seconds so that the faulty cartridge is less likely to explode, then carefully remove the load. The bad cartridge should be put in water.
- Suitable eye and face protection are essential when using a powder-actuated tool.
- The muzzle end of the tool must have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool must be designed so that it will not fire unless it has this kind of safety device.
- All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.
- If the tool develops a defect during use it should be tagged and taken out of service immediately until it is properly repaired.

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## Fasteners

When using powder-actuated tools to apply fasteners, there are some precautions to consider:

- Fasteners must not be fired into material that would let them pass through to the other side.
- The fastener must not be driven into materials like brick or concrete any closer than 3 inches to an edge or corner.
- In steel, the fastener must not come any closer than one-half inch from a corner or edge.
- Fasteners must not be driven into very hard or brittle materials which might chip or splatter, or make the fastener ricochet.
- An alignment guide must be used when shooting a fastener into an existing hole.
- A fastener must not be driven into a spalled area caused by an unsatisfactory fastening.

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## Hydraulic Power Tools

- The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed.
- The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

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## Jacks

- All jacks - lever and ratchet jacks, screw jacks, and hydraulic jacks - must have a device that stops them from jacking up too high.
- The manufacturer's load limit must be permanently marked in a prominent place on the jack and should not be exceeded.
- A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up.
- Use wooden blocking under the base if necessary to make the jack level and secure. If the lift surface is metal, place a 1-inch-thick hardwood block or equivalent between it and the metal jack head to reduce the danger of slippage.
- To set up a jack, make certain of the following:
  - the base rests on a firm level surface,
  - the jack is correctly centered,
  - the jack head bears against a level surface, and
  - the lift force is applied evenly.

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### Jacks (cont'd)

- All jacks must be inspected before each use and lubricated regularly. If a jack is subjected to an abnormal load or shock, it should be thoroughly examined to make sure it has not been damaged.
- Hydraulic jacks exposed to freezing temperatures must be filled with an adequate antifreeze liquid.

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## General Safety Precautions

- Employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the particular personal equipment necessary to protect them from the hazard.
- All hazards involved in the use of power tools can be prevented by following five basic safety rules:
  1. Keep all tools in good condition with regular maintenance.
  2. Use the right tool for the job.
  3. Examine each tool for damage before use.
  4. Operate according to the manufacturer's instructions.
  5. Provide and use the proper protective equipment.

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